AGRICULTURAL CHEMICAL RESEARCH DIVISION
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A List of

PUBLICATIONS ISSUED IN 1946

Mimeographed and Journal Articles and Addresses (with Abstracts) and Patent

CONTENTS

NOTE: A limited number of reprints of some of the journal articles are available. Those not available are marked with an asterisk (*), but may be consulted in technical libraries such as those located at State Agricultural Experiment Stations, Educational Institutions, and some public libraries.

Bureau of Agricultural and Industrial Chemistry
Agricultural Research Administration
United States Department of Agriculture

CITRUS

1. VELDHUIS, M. K.

*CITRUS FRUIT PRODUCTS RESEARCH. Citrus Indus. 27 (1) 6,7,15,18; 27 (2) 3,9,16; 27 (3) 11-14 (1946).

The research program of the U. S. Citrus Products Laboratory, Winter Haven, Florida, is described in a general way and a brief discussion is presented of each of the problems currently being investigated. (Previously published in Proc. Fla. State Hortic. Soc., 58:51-55, 1945, and Citrus Indus. 26 (10) 5-7, 10, 1945.)

2. SWIFT, L. J.

THE DETERMINATION OF CRUDE LIPID IN CITRUS JUICES. Jour. of the Ass'n of Official Agric. Chem., 29 389-95 (1946).

A method has been devised that is suitable for the routine determination of the crude lipid content of citrus juices. It is also adaptable for carotinoid determination. It probably would be suitable for other pulpy juices. The crude lipid extract is approximately two-thirds saponifiable fatty acid esters and one-third unsaponifiable matter. In comparing juices obtained from oranges by different methods of extraction, it was found that juice extracted in the laboratory with a burr reamer contained 25 per cent more lipid material and 50 per cent more total carotinoids than did juice from a Faulds laboratory juice press. Variations in screen size, within small limits, apparently do not affect appreciably the crude lipid content of the screened juice, at least when the screen interstices are of the order of 1 mm. in size and laboratory colander screens are used.

3. MC NARY, R. R.

*INDUSTRIAL WASTE AND BYPRODUCTS RECOVERY. Presented at the Short Course on Water and Sewage Treatment, University of Florida, June 6, 1946.

A general discussion of the waste disposal problems of all of the major industries of Florida with particular attention to the possibilities of utilizing wastes for production of valuable byproducts.

4. CURL, A. L.

OFF-FLAVOR DEVELOPMENT IN PROCESSED TANGERINE JUICE. The Fruit Prod. Jour. and Amer. Food Mnfr. 25 (12) 356-7 (1946).

A study of our experimental packs in glass containers indicated that it is possible to can a tangerine juice of good quality and with a stability similar to orange juice. However, suitable commercial methods of extracting the juice without obtaining excessive peel extractives will have to be developed. The presence of peel oil appeared to mask rather than contribute to the development of off-flavor. The fraction responsible for the development of a major portion of the off-flavor appeared to be the suspended material, probably the lipid or fatty fraction. Filtering tangerine juice resulted in the loss of nearly all of the characteristic flavor of the whole juice; the filtered juice on storage also developed much less off-flavor than the whole juice.

5. CURL, A. L., Moore, E. L., Wiederhold, Eunice, and Veldhuis, M. K.

CONCENTRATED ORANGE JUICE STORAGE STUDIES WITH PARTICULAR REFERENCE TO THE DEVELOPMENT OF SWELLS. Fruit Prod. Jour. 26, 101-109, 121, (1946).

Concentrated orange juice of 65° Brix should be kept in cold storage (40° F.). At temperatures of 80° and above, gas formation, darkening, and deterioration in flavor will probably occur, and losses of ascorbic acid (vitamin C) will probably be rapid. Storage at temperatures up to 80° for brief periods, while not desirable, would probably be permissible if necessary to facilitate transportation. Pasteurization of the final concentrate is recommended, particularly if it is not possible to maintain cold storage temperatures. This will eliminate the danger of fermentation with accompanying rapid swelling of the cans, but will not prevent deterioration in flavor, loss of ascorbic acid, and darkening. Gas formation at 80° and 95° F. may be due either to fermentation or to chemical decomposition. At 120° the microorganisms disappear and gas formation appears due to chemical action only.

6. KING, Gladys S.

*PERIPHERAL DEPOSITS OF CITRUS FRUIT VESICLES STAINED BY OIL-SOLUBLE DYES. Presented at meeting of the Amer. Ass'n for the Advancement of Science, Boston, Mass., Dec. 26-31, 1946.

Study of citrus vesicle constituents stained by fat-staining reagents. The "fatty" or lipid constituents of citrus fruits are of importance in relation to quality and deterioration of the canned juices and other products. Deposits and tissue structures stained by osmic acid and a number of oil soluble dyes are found peripherally in the vesicles and in spaces between them. These structures contain suberin which was identified by microchemical tests and isolation of phellonic acid. Fat soluble stains also serve to define intracellular plastids in the vesicle tissues.

7. SCOTT, W. Clifford

*PROCESSING AS AN ADDITIONAL OUTLET FOR CITRUS FRUIT. Proc. Lower Rio Grande Valley Citrus Institute meeting, 73-76 (1946).

A review of the development and increasing importance of citrus fruit processing, particularly in the Rio Grande Valley. As a result, increasing possibilities have developed for the profitable production of a number of processing byproducts. All of the possibilities for recovering such byproducts are considered, and progress of the research on some of them is reported in some detail.

CONFECTIONERY

8. HALL, H. H., Fahs, F. J., and Charbonnet, Louise H.

NEW AGRICULTURAL PRODUCTS USED IN CANDY. Food Indus. 18 1008-10, 1172 (1946).

Oil-seed, cereal, and legume products which are sources of protein, fat, carbohydrates, minerals, and vitamins, were incorporated into experimental nougat, caramel, fudge, creams, coconut pieces and hard candies. It was found that from four to seven percent of pulverized products derived from wheat, cottonseed, soybeans, and peanuts could be incorporated into nougat, caramel, and fudge without greatly changing the usual characteristics of these candies. Most of the experimental ingredients possessed flavors, which limited the amounts that could be incorporated into particular types of candy. Varying amounts of the vitamins, thiamin, riboflavin and niacin were added to candies by the special ingredients. Assays made on stored candies showed that thiamin and riboflavin were well retained for 180 days or longer at 74 to 80 deg. F. and 55 percent relative humidity.

9. HALL, H. H., and Fahs, F. J.

MODIFIED PECTINS MAKE POSSIBLE NEW TYPE CANDIES. The Confectioner 31 (6) 10, 11, 37 (1946).

Formulas are given for the preparation of experimental batches of pectin jellies and a butterscotch cream-type center with low-methoxyl pectin as the gelling agent. Comparison of jellies made with low-methoxyl pectin and 150-grade pectin show a saving of 50 percent of sucrose. The sugar content of the butterscotch cream-type center is 12.9 percent, compared with 58.2 percent in ordinary cream fondant and 31.1 percent in centers made with 150-grade pectin.

10. HALL, H. H. and Fahs, F. J.

ISOLATED PROTEINS IN CANDY MAKING. The Manufacturing Confectioner 26 (11) 27, 28 and 77 (1946).

Preliminary studies were made on the use of isolated peanut and soybean proteins as ingredients of candies. Peanut protein prepared in a pilot plant was found to contain residual peanut flavor which was imparted to candies. Soybean protein was incorporated into batches of honey flavored and vanilla flavored nougats, hard candies, and cast creams, and the effects on the quality factors, color, texture, and flavor, were determined.

PICKLING AND BRINING

11. ETCHELLS, J. L. and Jones, I. D.

PROCEDURE FOR BACTERIOLOGICAL EXAMINATION OF BRINED, SALTED, AND PICKLED VEGETABLES AND VEGETABLE PRODUCTS. Amer. Jour. of Public Health, 36 (10) 1112-23 (1946).

A systematic procedure is outlined for examination of brined, salted, and pickled products. Methods used in each step of the examination are described with procedures particularly applicable to products of this type. The following groups are covered by these procedures: coliform bacteria; acid-forming bacteria; salt-tolerant cocci; yeasts, mycoderma and molds; obligate halophiles, and butyric acid group.

12. JONES, I. D. and Etchells, J. L.

*TRENDS IN THE PICKLING INDUSTRY. Presented at meeting of Technical School for Pickle and Kraut Packers, Feb. 19-21, 1946, at East Lansing, Mich.

A general discussion of trends in the industry with particular reference to the increasing volume and importance of fresh, pasteurized cucumber products being produced. Problems arising as a result of this development are considered.

13. ETCHELLS, J. L.

SUGGESTIONS REGARDING PICKLE PLANT SANITATION. The Fruit Prod. Jour. and Amer. Food Mnfr. 26 (2) 45-48, 58 (1946).

In order to more thoroughly understand the over-all sanitation problem in connection with pickle plants, it is suggested that a sanitary survey of representative factories be sponsored by the pickling industry. Such a study, conducted by a trained sanitarian, has recently been carried out by the National Canners Association to provide an objective approach to their plant sanitation problem. In their survey a comprehensive questionnaire dealing with various aspects of plant sanitation was used. This excellent sanitary survey questionnaire, which is reproduced in the N.C.A. publication "Plant Sanitation" (13), could (with their permission) be readily adapted for pickling establishments.

14. ETCHELLS, J. L. and Jones, I. D.

CHARACTERISTICS OF LACTIC ACID BACTERIA FROM COMMERCIAL CUCUMBER FERMENTATIONS. Jour. Bacteriology 52 (5) (1946).

Identification studies on 49 cultures of lactic acid bacteria occurring during the acid fermentation of salt-stock cucumbers, under conditions typical of the industry, are reported. Thirty-six of the cultures were isolated during the active phase of acid formation from fermentations maintained at about 5, 8, and 10.5 percent salt concentration for one week, after which the brine strength was gradually increased. These isolates gave characteristics typical of those described for Lactobacillus plantarum (Orla-Jensen) Bergey et al and were allocated to this species.The remaining 13 cultures were isolated at random from six cucumber fermentations at brine concentrations ranging from about 11 to 12.5 percent salt. These isolates were also considered to belong to the species Lactobacillus plantarum.

SUGAR

15. FORT, C. A.

VARIABLE MINERAL COMPOSITION OF BLACKSTRAP MOLASSES. Sugar 41 (11) 36-7 (1946).

Attention is called to the rather wide variation of individual mineral constituents in nine samples of Louisiana blackstrap and one of Cuban origin. Detailed tables of data are given on all of the identified ionic constituents of the ash accounting for about 90 percent of the molasses solids.

SUGAR BEETS

16. FORT, C. A. and Stout, Myron

*SUGGESTED PROCEDURE FOR OBTAINING LOWER TEMPERATURES DURING SUGAR BEET STORAGE. Proc. meeting of the Amer. Soc. of Sugar Beet Tech., 515-523, Feb., 1946.

Results are given on an experiment in which beets were stored in a bin with air-tight sides and cooled by forced circulation of night air at near the freezing point. The top beets were whitewashed and temperatures remained low for 77 days. Special samples from these experimentally cooled beets lost only 0.12 lbs. of sucrose per ton per day as compared with 0.26 lbs. of sucrose per ton per day in the factory pile which was about 10° F. higher in temperature. The economic value of the method in large scale storage of beets is discussed.

17. FORT, C. A., Byall, S. (I) Hall, H. H., and Teunisson, Dorothea J. (II).

REPORT OF STUDIES ON UNIFORMITY OF QUALITY OF BEET SUGARS. I. Chemical and Physical Studies on Beet Sugars of the 1945 Campaign. II. Biological Studies of Beet Sugars. AIC-123, July, 1946.

An annual report of the processing data of the sixty-seven beet sugar factories operated during the 1945 campaign and of the mineral analysis, physical and biological quality of composition of the sugars produced. There are included special studies of screening analysis, of the relation of sugar quality to the composition of the massecuite from which it was boiled and of the regional non-sugar composition of white massecuites, sugars, and molasses.

SUGAR CROP BYPRODUCTS - ACONITIC ACID

18. BALCH, R. T., Broeg, C. B., and Ambler, J. A.

*ACONITIC ACID IN SUGARCANE PRODUCTS. Abridged - Internatl. Sugar Jour. 48 (571) 186-187 (1946). (See Sugar 40 (10) 32-35 (1946).

A brief summary of results published in detail in "Sugar" in 1945. The general results on analysis of different varieties of cane, various sugarhouse products, and materials from different localities are discussed. For quantitative data the original article in "Sugar" should be consulted.

19. VENTRE, E. K., Ambler, J. A., Henry, H. C., Byall, S., and Paine, H. S.

EXTRACTION OF ACONITIC ACID FROM SORGO. Indus. and Eng. Chem. 38 (2) 201-4 (1946).

Aconitic acid in the sorgo plant occurs both as free acid and combined with the cations of the juice. The aconitate precipitated from sorgo juice contains magnesium as well as calcium. Efficient precipitation of the aconitate requires concentration to a density of 50° to 60° Brix and heating to temperatures above 75° C. Almost twice as much aconitate was precipitated by using lime and calcium chloride as by using lime alone.

20. AMBLER, J. A., Roberts, E. J., and Weissborn, Jr., F. W.

THE PRODUCTION OF ITACONIC ACID FROM THE CRUDE ACONITATE OBTAINED FROM SUGARCANE MOLASSES. AIC-132, Dec., 1946.

Complete results are given of the pilot plant experiments on recovery of calcium aconitate from "B" molasses and its conversion to itaconic acid. A flow sheet and optimum operating conditions for the aconitate recovery process are given which serve as a basis for commercial production of this byproduct. At the present time, commercial interest is centered on aconitate production to supply the large demand for aconitic acid. The report includes addenda on a procedure for eliminating magnesium from crude calcium aconitate and details of accurate analytical methods for use in operating the process. Average figures for a large number of pilot plant runs indicate recovery of 46 percent of the aconitic acid originally present in molasses which contain approximately four percent aconitic acid on solids.

TUNG

21. DAVIS, G. K., Mehrhof, N. R., and McKinney, R. S.

EFFECT OF TUNG MEAL IN RATIONS FOR GROWING CHICKS. Poultry Sci. 25 (1) 74-79 (1946).

Eight lots of two-day old chicks were fed 0, 5, 10, and 15 percent levels of tung meal and one additional lot of three weeks old chicks was fed a 15 percent level of tung meal to investigate its possible use as a source of protein in poultry rations. The tung meal proved toxic whether raw, heated, or heated and sifted and caused heavy mortality at 10 and 15 percent levels. At 5 percent and higher levels the tung meals interfered with feed utilization. Tung meal, raw or autoclaved at 115.5° C. and 11.5 pounds pressure or at 128° C. and 22 pounds pressure, is not safe for use in chick feeds.

22. HOLMES, R. L. and Pack, F. C.

EFFECT OF SHELL CONTENT AND STORAGE ON EXPELLING OF TUNG NUTS. Oil and Soap 23 (10) 314-16 (1946).

Expeller tests were made on ground tung nuts containing all of the shell (33%) at the time of hulling and after the nuts had been in storage for one and two months. Comparative tests were also made on material containing about 24% shell which had passed through the disc huller in regular mill operation. One test was made on handshelled kernels which were entirely free of shell. It was found that meal containing all of the shell not only processed satisfactorily, but the recovery of oil from such material was somewhat higher than from material containing about two-thirds of the shell. The amount of oil expelled per hour was about the same in both cases. The kernels completely cleaned of shell expelled very inefficiently. In general, therefore, it seems that, with the particular type of expeller used, a considerable amount of shell in the meal is essential for efficient expelling. Bags of nuts with hulls removed but with the shells intact showed no deterioration after two months' storage in a well-ventilated shed.

23. MC KINNEY, R. S. and Oglesbee, Ruby E.

*METHODS OF ANALYSIS USEFUL IN EVALUATING TUNG FRUIT. Proc. Amer. Tung Oil Ass'n meeting Part I, 1-5 (1946).

Various methods for determining oil and moisture content of tung fruit are discussed with particular emphasis on rapid methods that might be used by the mills in evaluating fruit for processing. Results obtained by seven referees with methods tentatively adopted by the subcommittee on tung of the Analysis Committee of the A.O.C.S. are reported. These were in fairly good agreement even though they were carried out in twenty-five fruit samples.

24. HOLMES, R. L. and Pack, F. C.

*THE SAMPLING OF TUNG FRUIT AT THE MILL. Proc. Amer. Tung Oil Ass'n meeting, Part I, 40-46 (1946).

Sampling of fruit delivered to the mill is the largest source of error in obtaining analyses of oil and moisture content. Factors which enter into the proper sampling and the error to be expected with samples of various sizes are discussed. Evidence is presented that a 100-fruit sample properly taken at random is necessary to permit analysis for oil content within 0.5 percent of the true value. The error in sampling dehulled fruit is much less than in the sampling of whole fruit.

25. HOLMES, R. L. and Pack, F. C.

*EFFECT OF DRYING AND STORING TUNG SEEDS ON QUALITY OF OIL AND MILLING CHARACTERISTICS OF THE SEEDS. Proc. Amer. Tung Oil Ass'n meeting Part II (1946).

Tung seeds, hulled but with most of the shells intact, were artificially dried at two temperatures in December and January and put in storage in bags in a well ventilated shed, along with similar seeds which had not been artificially dried. At bimonthly intervals tests on stored seeds were made on a commercial expeller. The acid value of oil in the intact seeds put in storage at 10% moisture content early in December and late in January had risen only slightly, from .5 to 0.8-1.5, by the following April. Intact seeds dried to about 10% moisture at temperatures of 158° F. and about 172° F. (155 - 190° F.) processed in the expeller as well the following April as they did when put in storage in early December, and there was no deterioration in the quality of the oil. Intact seeds which were dried from 26% moisture to about 10% moisture in late January at 155 - 212° F. (the temperature remained at 212° F. for at least an hour) did not process efficiently after two months' storage, nor did the material stored at the same time without artificial drying. Caution should be used in storing seeds for long periods after drying at temperatures approaching 212° F. or with high moisture contents (20% or above) until more experience is available.

26. MC KINNEY, R. S.

*THE TUNG OIL STUDIES OF THE BUREAU OF AGRICULTURAL AND INDUSTRIAL CHEMISTRY, U. S. DEPARTMENT OF AGRICULTURE. Radio Series No. R-558 (1946).

A brief resumé given by radio of the general problems dealt with at the tung oil laboratories of the Bureau.

27. MC KINNEY, R. S.

TUNG OIL. AIC-94 (Supersedes MC-55) November, 1946.

General information on production of tung nuts and particularly methods used in the American industry for recovery of oil. Data on production and chemical and physical properties of the oil are given. An extensive bibliography is included.

28. HOLMES, R. L. and Pack, F. C.

THE APPLICABILITY OF CONTINUOUS SOLVENT EXTRACTION TO TUNG OIL. AIC-116, September, 1946.

In this report the present status of solvent-extraction and factors to be considered in adopting this method for tung oil production have been presented as concisely as possible. Certain problems requiring further study have been indicated, which must be solved before the detailed steps of a complete solvent-extraction process for this application can be developed and recommended. Economics of the process as compared to present mechanical extraction are such as to warrant intensive study and development, and careful consideration of its advantages in localities where the extraction plant can be assured of 100 tons per day of fruit throughout the processing season.

PATENT

*Combination Sunlight or Artificial Heat Dehydrator and Hotbed. Walter T. Schreiber. U. S. Patent 2,399,696 (May 7, 1946).

NOTE: Patent may be purchased for 25¢ a copy at the U. S. Patent Office, Department of Commerce, Washington 25, D. C. Stamps are not accepted and coins are sent at the sender's risk.

LFMartin:LG
September, 1947